

SIFIDS

Scottish Inshore Fisheries
Integrated Data System

Work Package 7 Final Report

Engagement with Inshore Fisheries to Promote
and Inform

Project code: WP0007SIFIDS



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EXECUTIVE SUMMARY

This report documents Work Package 7 of the Scottish Inshore Fisheries Integrated Data Systems (SIFIDS) Project, which was designed to facilitate engagement with the key stakeholders including; inshore fishers, their representative bodies, Regional Inshore Fisheries Groups, Marine Scotland including Policy, Compliance and Science.

The SIFIDS Project focused on 12 metre and under inshore fisheries vessels, of which around 1,500 are registered in Scotland including those that work part-time or seasonally. The facilitation team was set various targets for engagement based on the requirements of other work packages. The success of the overall project was dependent to a significant extent on securing voluntary engagement and input from working fishers. Previous experience has shown that having a dedicated project facilitation team is an extremely effective model for establishing the necessary trust to encourage industry-participation in projects such as this.

The WP7 facilitation team comprised three individuals who have significant marine and fisheries related experience and wide-ranging skills in communications and stakeholder engagement. They worked together flexibly on a part-time basis, ensuring staffing cover over extended hours where required to match fishers' availability and geographical coverage over Scotland.

The team was involved over the entire contract period from initial inception meetings in December 2016 until the (extended) project completion date of October 2019. The role of the WP7 team of facilitators included: -

- providing a public face to the project and a central point for two-way communications;
- presenting information about the project through a range of meetings and events;
- ensuring participants were fully informed about the aims of the project, its progress and the conclusions reached.
- developing information, communications and media materials in various formats for project promotion, updates and feedback;
- recruiting and fostering engagement and voluntary participation by the fishing industry;
- supporting and enabling outreach by work-package leaders;

Some tasks required minimum numbers of participants within defined geographic locations or harbours, as well as within specific fishing sectors (e.g. static gear). This provided the main challenge and workload for the facilitation team, because the project relied on voluntary and unpaid co-operation and participation by fishers from within a limited pool. Fishers from around the coast of Scotland were involved in different work packages, as indicated by figures 2 and 3 in Section 2, Methodology, below.

The success of the facilitation team in meeting its targets and seventeen defined objectives is outlined in Section 5 (Appendix). The engagement work was founded on clear practical and ethical objectives, as outlined in section 5.2 (Appendix) below.

Vessel/fisher recruitment target numbers for two objectives were revised downwards during the project where these proved impossible to deliver, e.g. where the timing of some work package developments coincided with winter seasons, off-seasons or simply periods of bad weather, which limited the number of fishers able to participate. These adjustments were made in conjunction with the WP leaders, and the WP7 team quickly adapted their tasks and their objectives accordingly to accommodate and mitigate these and other changes made to the specifics of the work packages during the project.

Final legacy communications materials were developed including six short videos and a newsletter (hard copy and electronic format), all of which will be used to provide feedback to the project participants, wider inshore fishing industry and other interested stakeholders about

the project outcomes and outputs. Some observations / lessons learned are included in this report -Section 4, Conclusions.

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The facilitation team is indebted to all fishers, fishing representatives, suppliers, buyers, support industry representatives and Fishery Officers for their positive engagement, support, views and time invested in SIFIDS. Without this goodwill and people taking often significant amounts of time away from their own business activities and busy schedules, the project would not have succeeded to the same extent. The team also extends thanks to the Project Co-ordination Team (PCT) at the University of St Andrews for guidance and support throughout, and to numerous members of Marine Scotland Compliance, Science and Policy for continued help and support.

The facilitation team wishes to particularly acknowledge: -

- the time, support and trust given by over 130 vessel skippers / owners around Scotland who volunteered to host SIFIDS researcher observer trips or were instrumental in trialling different equipment and systems
- the hundreds of other fishermen who participated in the socio-economic survey, trialled the FISH1 app etc., as well as providing information and feedback at meetings.
- the support and advice received from Marine Scotland Fishery Officers and other staff who passed on SIFIDS WP7 contact details to fishers to assist with engagement.
- numerous national and local buyers for their permission to access shellfish stocks for WP2 morphological studies (Scotprime Seafoods Ltd., ScotLive Shellfish Ltd., Aquascot Group Ltd., DR Collin & Son Ltd. and Keltic Seafare Ltd.)
- Keltic Seafare Ltd. for their input to WP3 remote identification of scallops, and for the generous use of their vessel to deploy equipment and undertake diving for WP3
- the support of the Regional Inshore Fisheries Group Chairs, who allowed regular SIFIDS updates to be given at meetings and who circulated information to their association members for onward circulation to individual fishermen
- all fishers who agreed to be filmed and gave time to participate in the end of project videos for various work packages (Duncan McAndrew, Alistair (Bally) Philp, Andrew Whiston, Richard Scott, Andrew Lochhead, and Alasdair Hughson)
- Craig Butler for technical advice and practical input to WP5
- the contractors of the relevant work packages who worked closely with facilitators to achieve project successes

Direct acknowledgement of other fishers and vessel owners who provided significant support and expertise are included within the respective Work Package reports.

1 BACKGROUND AND FUNCTION OF WP7 FACILITATION TEAM

1.1 Work Package 7 role within SIFIDS Project

The Scottish Inshore Fisheries Integrated Data Systems (SIFIDS) Project comprised twelve diverse but interlinked work packages (WP) led by various subcontractors, all responsible to the Project Co-ordination Team (PCT) within the University of St Andrews. The overall aim was to investigate options for using open source technology and developing prototypic systems and processes that together offered a partially automated, integrated, cost-effective and low-maintenance system of data collection. Data collected would in principle inform fisheries management, stock assessment, marine planning, future inshore policy development and provide outputs relevant to fishers' businesses. A key underlying principle was to engage industry directly in the data gathering process.

A facilitation team formed WP7, with the core aim to help all work packages to some degree engage with the fishing industry. For example, the team recruited volunteers to trial tracking equipment (WPs 2A & 2B), identified fishers willing to host observers (WP 8), engaged with processors to gain access to the facilities for measuring crabs and lobsters (WP 2B), sought individuals or companies to take part in the socio-economic assessment (WP 4), identified representatives from the scallop industry who could help with the development and testing of remote detection methods for scallops (WP 3), and sought fishers to voluntarily trial the Smartphone App for reporting fisheries data and environmental observations (WP 5).

WP7 required the facilitation team to have a fluid and wide-reaching remit to enable them to contribute to and support the different work package elements as they evolved. This was envisaged and identified in the initial SIFIDS structure diagram (Figure 1).

It was also the facilitators' role to feed information back to the fishing industry regarding project progress and results, while relaying any comments back to the researchers undertaking the work. This allowed for fluid, two-way engagement between the SIFIDS project and the fishing industry.

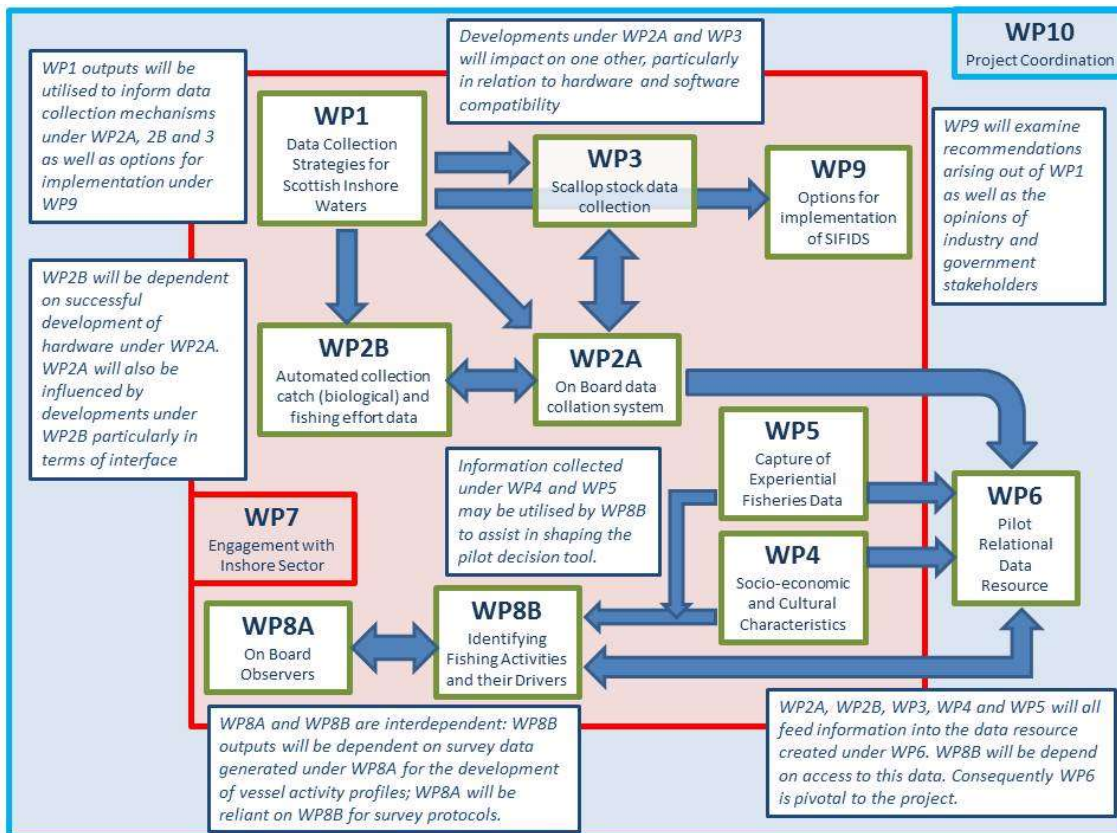


Figure 1. Chart showing the interlinks between different SIFIDS work packages and the WP7 facilitation and engagement role.

1.2 The WP7 Facilitation Team

The independent contractors who jointly bid to undertake the WP7 engagement work were

- Dr Kyla Orr (Marine Ecological Consulting) - (approx. 44% of overall staff time input)
- Ali McKnight (Agroecosystems Ltd.) - (32% of time)
- Kathryn Logan - (24% of time)

The WP7 facilitation team provided:

- significant expertise in marine and fisheries-related issues
- proven success in delivering similar engagement work for fisheries projects
- project facilitation, communication and media skills
- broad networks of contacts across Scotland relevant to fisheries and the marine sector
- geographical coverage around Scotland
- flexible working hours to match fishers' requirements.

Kyla and Ali had previously worked together to successfully deliver fisheries engagement work under the European Fisheries Funded (EFF) Project 'Evidence Gathering in Support of Sustainable Scottish Inshore Fisheries'¹. This included recruiting over 270 vessels to voluntarily fit AIS equipment in order to trial AIS as a method to establish the location of fishing activities, and was a precursor to the SIFIDS project. Kathryn formerly provided secretariat services to three Inshore Fisheries Groups covering the North West, Moray Firth & North Coast and South East areas, and through that role liaised with Ali and Kyla to help promote the EFF project.

1.3 WP7 management

The SIFIDS Project Control Team (PCT) set clear targets and parameters for the work to be delivered, founded on ethical, legal and professional guidelines. The facilitation team was then given flexibility to achieve those objectives. This allowed a necessary degree of latitude in terms of approach in order to engage successfully with fishers and other stakeholders, and avoided micro-management.

Excellent communications between the facilitators and the PCT included regular emails (daily – weekly), online meetings (monthly) and telephone discussions (as and when required), as well as participation in the collective review meetings with all project staff, enabling clarification or fine-tuning of objectives and task allocation, as well as oversight of progress. This provided a dynamic environment for constructive suggestions and feedback to optimise project progression. The facilitation team continually worked towards achieving objectives stipulated by other WPs (for example to recruit a target number of vessels) and maintained regular contact with WP contractors to provide updates on recruitment progress and levels of voluntary participation from fishers.

2 METHODOLOGY: THE WP7 ENGAGEMENT APPROACH

The facilitators aimed to provide transparent, regular and inclusive engagement with the fishing industry to promote understanding of, and buy-in for the project's aims, and further develop the sense of trust and good-will between fishers, researchers and managers nurtured through earlier projects.

Such engagement can benefit both the fishers involved and wider industry, by building their knowledge and relationships with scientists and policy makers, through enhanced and mutual information exchange. In both the immediate and longer-term, this is seen as a key factor to

¹ More information, summary videos and full reports can be found here:
<https://www.masts.ac.uk/research/sustainable-scottish-inshore-fisheries/>

encourage the collection, collation and joint use of robust data that is called for by the inshore fishing industry, regulators and policy makers.

Since the SIFIDS Project built upon the results of the EFF work, the facilitators re-established contact with many of the fishers who had participated in that previous project to determine if they would be willing to volunteer for the SIFIDS Project. In addition, facilitators reached out to the fishing industry through the Fishery Officers and Regional Inshore Fisheries Groups, who circulated calls for the participation to fishers. In some instances, facilitators were required to directly approach fishers at harbours to make them aware of the SIFIDS project and ask if they would be willing to participate. Thus, much of the facilitation work involved contacting fishers and communicating with them individually by their chosen means – text, phone, email or in person. A freephone 0800 number was also setup to field any calls or queries from the fishing industry. The times when fishers were available required the facilitators work flexibly and with different approaches. Judgement was required to ensure that fishers remained engaged but did not feel overburdened with requests for support and participation.

Consultation fatigue, suspicion about possible ulterior motives, concerns about information being made available to Fisheries Compliance officers, lack of time and/or a general unease related to participation were also factors affecting the likelihood of fisher involvement. At all times, fishers were given the option to opt out of communications and to change their mind about taking part in any activity. Confidentiality and data protection were primary considerations.

The SIFIDS project and the WP7 team relied from the outset on the engagement, input and support of fishers, fishing association representatives, Fisheries Offices, suppliers, and many others across the industry.

The geographical range of involvement across the Work Packages is indicated in the following diagrams (Figures 2 and 3).

WP1 – Review & Optimisation of Shellfish Data Collection Strategy

WP2A- Onboard data collation (OBDCS)

WP2B- Onshore morphometric studies

WP3 – Scallop sampling

WP4 – Socio Economic Study

WP5 – FISH1 App / Observations

WP6 – Pilot Relational D/base

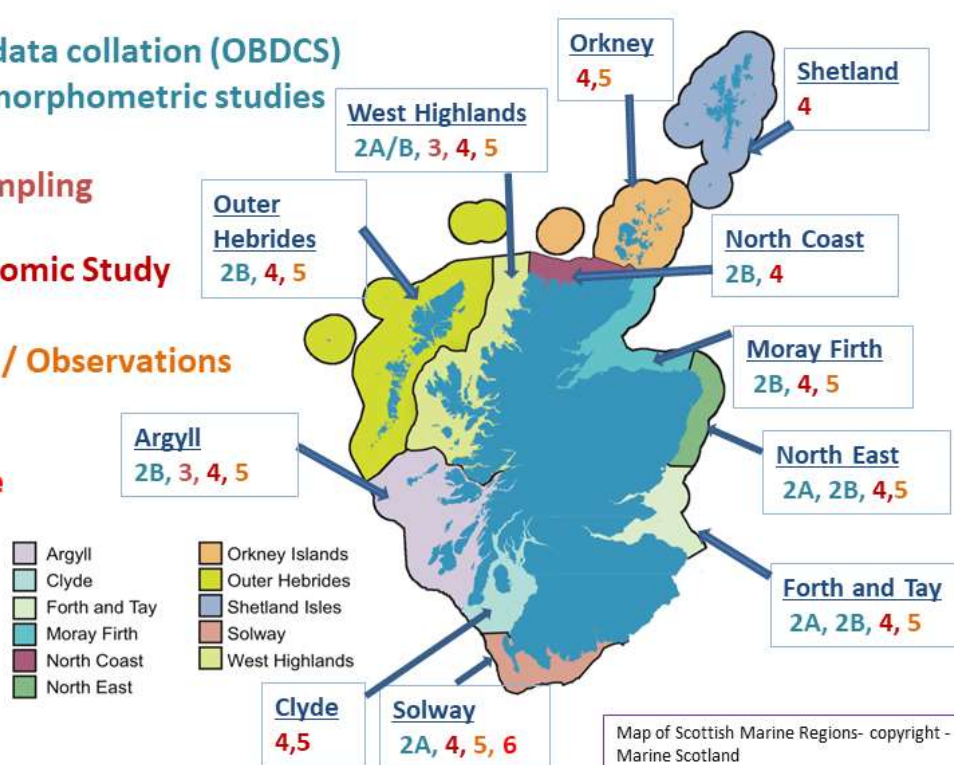


Figure 2. Map indicating main target areas and focus of facilitator engagement effort – Work Packages 2 – 6.

WP8 – Creel boat Observation Trips

134 trips – 106 vessels

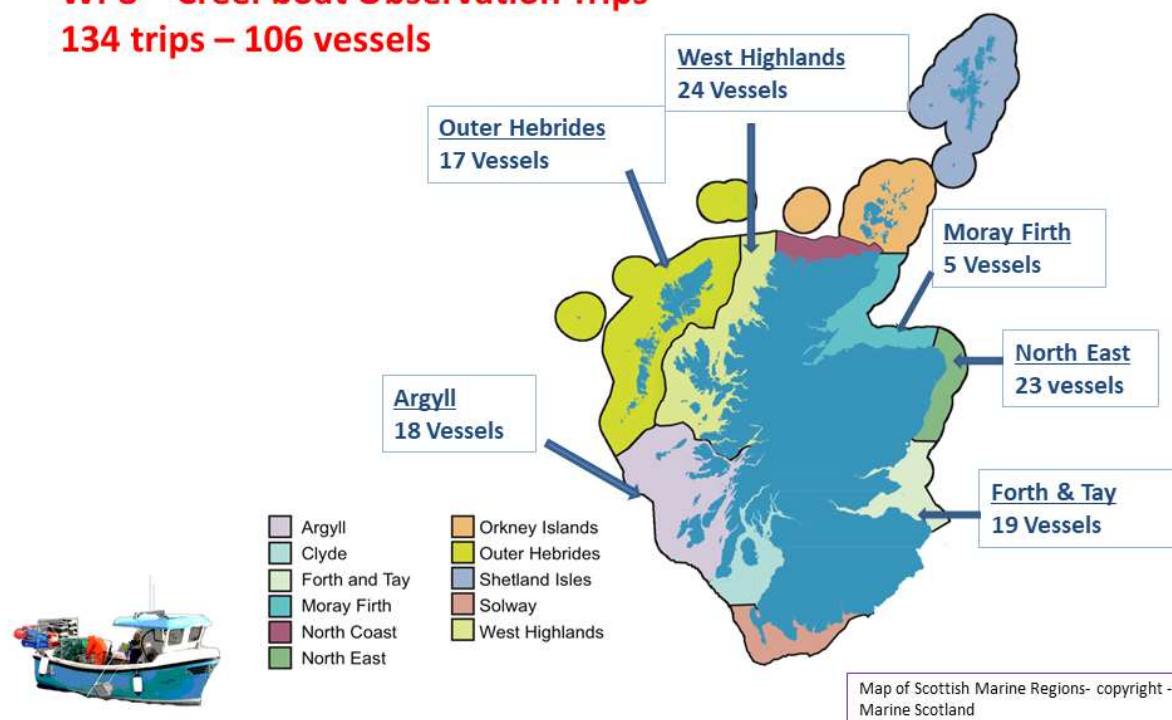


Figure 3. Map indicating main target areas and focus of facilitator engagement effort for Work Package 8 - creel sector trips.

2.1 Communications Plan

In early 2019 the facilitators produced a formal Communications Plan identifying targets and methodologies for dissemination of the final project outcomes and overall results as the project neared its end. The plan was discussed with Marine Scotland during the latter part of the project. Providing regular updates and information to industry, particularly those that participated in the project, was a key element in maintaining interest and buy-in. This process also encouraged additional input and ideas from the industry who could see opportunities and future development options based on the prototypes and trials developed during the project. The final tables of meetings attended and communications materials produced (videos, newsletters, etc) are included within the appropriate sections of this final report, so the plan is not attached to avoid duplication.

3 OUTCOMES AND SUMMARY OF ACTIVITY

The WP7 engagement work comprised two main elements: -

- Securing the voluntary participation of fishers to meet WP targets in terms of numbers, geographic locations, size of vessel, fishing sector, etc.; and
- Communication and promotion of the project aims and dissemination of information to the fishing industry and other stakeholders.

3.1 Main Fisher Engagement work / Specific Work Package Support

Main support was provided by the facilitators in relation to the following WPs: -

WP	WP outline	Facilitation Team involvement
WP2A	Development and pilot deployment of an Autonomous Fisheries Data	- Supported recruitment of 15 creel vessels to trial vessel equipment. A subset of 5 of these trialled

WP	WP outline	Facilitation Team involvement
	Harvesting System [On-Board Central Data Collection System (OBCDCS)] (Seascope Fisheries Research Ltd)	equipment to record fishing effort (e.g. via creel tags) - Obtained interim and supplementary feedback from the users and developers - Produced a video to showcase WP2 results including arranging interviews with fishers
WP2B	Investigating non-invasive and semi-automated techniques for recording biological data on crabs and lobsters – species, sex and size (Seascope Fisheries Research Ltd) (Crab and lobster 2D laser scanner)	- Provided researchers with links to shellfish suppliers and processors to enable detailed morphometric measurement of brown crab and lobsters. This involved contacting 8 processors with background information and to seek approval for their engagement, resulting in 4 processors being involved - Produced a video of the WP2B results, including arranging interviews with fishers (The separate morphometrics study to take physical measurements of animals was to support the machine learning done by the WP8 team, not under WP2B)
WP3	Assess the potential of novel, automated technologies for the collection of scallop stock data (Led by Richard Bates, University of St Andrews)	- Following initial detection trials which were limited by seabed stocks being lower than expected, the facilitators were asked to research options for providing live scallops for additional trials. A scallop diver and industry representative helped identify a location on the west coast with high enough densities of scallops where trials could be conducted. This proved very successful. - Produced a video of the project outcomes including arranging and undertaking an interview with a scallop diver.
WP4	Assessment of socio-economic and cultural characteristics of inshore fisheries (Imani Ltd and SRSL)	- Provided links to key contacts across inshore fisheries and wider supply chains for in-depth interviews by WP4 as part of their socio-economic study (45 interviewees in Argyll, Forth and Tay, Solway and West Highlands areas). - Supported and promoted completion of the online questionnaire by fishermen (total 133 responses).
WP5 WP5 cont.	Capture and Incorporation of Experiential Fisheries Data (FISH 1 mobile phone App) (Led by Mark James, University of St Andrews)	- Assisted developers with refining and testing App functions and features, and ensuring the online form provided data statutorily required for FISH1 returns by vessels (10m and under). - Recruited 12 fishers to trial the app, after vigorous efforts and arranging 4 harbour-side drop-in events. The numbers were significantly limited by the trial App only being available for

WP	WP outline	Facilitation Team involvement
		<p>Android phones, whereas a high percentage of fishermen had i-phones. The timing of the release of the App in the autumn when many vessels were preparing to take their boats out of the water for the winter also reduced uptake. Although initial interest and planned uptake was higher (approx. 20-25), some fishers did not upload the App.</p> <ul style="list-style-type: none"> - Provided detailed guidance on downloading and using the App, as well as telephone support. - Liaised with Fishery Officers (FO) to ensure that electronic forms submitted via the App were formatted to meet their requirements, and obtained informal feedback - Liaised with users re ending the trial at the original project end (May 2019) and actions for reverting to paper returns to the FO. - Developed an online questionnaire for fishers / vessel owners to provide feedback on the FISH1 App and collated suggestions for future enhancements. - Produced a video of the FISH1 App including arranging interviews with fishers who used the App.
WP6	<p>Development of a Pilot Relational Data Resource for the Collation and Interpretation of Inshore Fisheries Data</p> <p>(Seascope Fisheries Research Ltd.)</p>	<ul style="list-style-type: none"> - Facilitators liaised with WP2A fishers (who trialled onboard recording equipment) on the allocation of personal, secure log-ins to view their own data via the first release of the WP6 user interface. - Provided guidance and significant telephone support to try to identify and overcome difficulties in logging-in or using the interactive facility (technical issues with the interface were discovered by developers which were only resolved close to the end of the project, preventing more detailed feedback from all bar a few fishers). - Produced a video on WP6 data visualisation alongside PCT
WP8A WP8A cont.	<p>Linking vessel movement patterns with specific fishing activity and predicting the effects of change on fleet behaviour</p> <p>On-board observer trips- static gear vessels</p>	<ul style="list-style-type: none"> - Liaised with WP leads and fishers / Fishery Officers to help identify ports where on-board observer trips would take place - 17 target ports and various reserve ports were selected across 9 Fishery Administrative areas within 7 Scottish Marine regions. - Recruited a pool of static gear vessels to host observer trips: 134 trips were made on 104 vessels (some hosted summer and winter trips).

WP	WP outline	Facilitation Team involvement
	<p>Additional trips on prawn trawl and scallop dive vessels</p> <p>(Led by Tania Mendo, University of St Andrews)</p>	<p>The 104 vessels represented around 7% of the total pool of the registered vessels under 12 metres, and a significant percentage of the vessels available at the target ports. It was difficult to match vessel and observer availability, as the observers needed to complete trips in one area to avoid unacceptable travel times. Some trips were cancelled due to bad weather or vessel problems and other issues also affected schedules.</p> <ul style="list-style-type: none"> - Recruited another 21 potential <i>nephrops</i> trawl and scallop diving host vessels, of which 15 were sampled by the Seascope observers (in summer 2019 following the project extension) - Designed materials to recruit vessels and obtain formal agreements on use of data and record any feedback - Produced a video showcasing the WP8 results including interviews with fishers and undertaking some footage.
WP8B	<p>Additional Tracker / solar tracker trials</p> <p>(Led by Mark James, University of St Andrews)</p>	<ul style="list-style-type: none"> - Recruited a pool of 15 vessels in widespread locations to trial simple GPS trackers (a mixture of solar-powered and engine-linked systems) to assess reception/ signal quality. Small vessels under 10m were targeted to show that GPS units can be used by all sizes of vessel, even those with no wheelhouse or electrics. The circulated "Solar panel trial information" can be found in appendix 5.6 ². <p>Information on trackers was included in the awareness video for WP8 above.</p>

3.2 Communications with industry (including meeting attendance)

Over the three years (2016-2019) a range of communication methods and available opportunities were used to inform a wide range of stakeholders and the public about the project. The range of activities by the WP7 facilitation team, as well as presentations given by the Project Co-ordination Team is included in Table 1 below- 'Meetings and Presentations Summary'.

Events at which Facilitation Team members gave presentations or provided information include the following: -

- 14 Regional Inshore Fishery Group meetings (Outer Hebrides, West Coast and North and East Coast);
- 7 other fisheries relevant events, including two Marine Scotland Fishery Officer conferences and two Marine Scotland Inshore Fishery Conferences, MASTS Annual Science Meeting

² Additional information was provided to individuals and groups upon request regarding the research on use of GPS trackers on inshore fishing vessels by the SIFIDS Project

(2018 and 2019), the Clyde Fishermen's Association AGM 2019 and the Solway Firth Partnership Advisory Group;

- 4 SIFIDS (facilitator- arranged) harbour-side drop-in events relating to the FISH1 app (WP5) and two meetings with specific Fishery Association representatives.

Other relevant meetings were attended by facilitators where SIFIDS was promoted (including Community Inshore Fisheries Alliance, the Future of Fisheries National Discussion Event and Priority Marine Features /Marine Protected Areas- Inshore Fisheries Management Measures Workshop).

One communications objective was not fully met, namely objective 5b – 'to organise a minimum of 10 meetings in ports where project vessels were based to ensure participating fishers were kept updated on project progress (particularly WP2 and WP8 pilot area/s)'. From experience, such meetings did not offer the most effective means of communicating with local fishers, whose schedules can be unpredictable depending on weather and other factors. Information was instead provided through email updates, newsletters, presentations to the local fisheries association representatives attending Regional Inshore Fisheries Group meetings, by cascading through contacts with individual fishermen and associations, as well as being made available through local FOs. The newsletters produced and circulated are shown in the Appendix 5.3 and 5.4.

As part of WP2, WP5 and WP8 vessel recruitment, facilitators also visited many ports and harbours 'informally', particularly where they were struggling to find enough fishers to volunteer for the project via other means of contact (e.g. via Fishery Officers and Association reps). Facilitators would then approach fishers working at the pier and provide information about the SIFIDS Project (e.g. via a flyer) and ask if they would be willing to participate in the trial. This approach often opened good channels of communication in 'hard to reach' areas. A copy of one of the flyers used to recruit vessels is in the Appendix 5.5.

The observers from Seascope Fisheries Research Ltd who undertook on-board trips also proved to be a well-received source of information about the project to fishers.

Six project videos (outlined in Section 3.3 below) detail the outcomes of various WPs. These aim to provide an accessible legacy of interest to those who are unlikely to read the project reports and deliver substantive feedback to project participants and the fishing industry.

Table 1. Meetings and Presentations Summary

Month/Year	Communication	By	Main Audience
Feb-17	Presentation to Outer Hebrides RIFG Meeting, via video conference (VC).	Ali McKnight, Kyla Orr (WP7 facilitators)	Outer Hebrides RIFG executive committee and attendees
Mar-17	Attended North and East Coast RIFG Meeting, Perth	Kathryn Logan (WP7 facilitator)	N&EC RIFG executive committee and attendees
Mar-17	Presented at the Marine Scotland Compliance Conference	Mark James	various members of Marine Scotland Compliance, predominately Fishery Officers
Apr-17	Presented at West Coast RIFG Meeting, Glasgow	Kyla Orr (WP7 facilitator)	WC RIFG executive committee and attendees
Apr-17	Scottish Inshore Fisheries Conference - Session to introduce the EMFF-funded Scottish Inshore Fisheries Integrated Data System (SIFIDS) Project	presentations from Mark James, Jim Watson, all Work Package team leaders, including WP7 facilitators	Conference attendees
Apr-17	Meeting with Fisherman's Mutual Association, Pittenweem about recruiting fishers to host observers (WP8)	Kyla Orr and Kathryn Logan (WP7 facilitators)	Chair of Fisherman's Mutual Association, Pittenweem
May-17	Collective Review meeting of all SIFIDS Work Package and overall progress	Presentations from all Work Package team leaders	Members of Marine Scotland and chair of WC rIFG <i>Members from Marine Scotland Policy, Compliance and Science and any other teams deemed appropriate were openly invited to the meeting</i>
May-17	Meeting with North West Responsible Fisherman's Association, Kyleakin, about recruiting fishers to host observers (WP8)	Kyla Orr (WP7 facilitator)	Members of North West Responsible Fisherman's Association
May-17	SIFIDS leaflets circulated and contacts made at Skippers expo	Kathryn Logan (WP7 facilitator)	Fishermen delegates and stand-holders
Sep-17	Collective Review meeting of all SIFIDS Work Package and overall progress	Presentations from all Work Package team leaders	Members of Marine Scotland and chair of WC rIFG <i>Members from Marine Scotland Policy, Compliance and Science and any other teams deemed appropriate were openly invited to the meeting</i>

Sep-17	Brief project update provided at North and East coast RIFG meeting, Perth	Kathryn Logan (WP7 facilitator)	N&EC RIFG executive committee and attendees
Oct-17	Attendance and delivery of SIFIDS presentation at Marine Scotland Compliance Conference, Aviemore	Kyla Orr, Ali McKnight (WP7 facilitators) and Tania Mendo	Conference attendees (MS Compliance)
Oct-17	Presented at West Coast RIFG Meeting, Glasgow	Kyla Orr (WP7 facilitator)	WC RIFG executive committee and attendees
Oct-17	Port visits made by facilitators to following locations to recruit vessels to host observers for WP8: Oban, Balvicar, Stonehaven and Montrose	Kyla Orr and Ali McKnight (WP7 facilitators)	Face-to-face communication with fishers at ports
Nov-17	Port visits made by facilitator to recruit vessels to host observers for WP8 incl. Eyemouth, Burnmouth and St Abb	Kathryn Logan (WP7 facilitator)	Face-to-face communication with fishers at ports and local Fishery Officer
Jan-18	Brief update and flyer provided at North and East Coast RIFG, Perth	Kathryn Logan (WP7 facilitator)	N&EC RIFG executive committee and attendees
Feb-18	SIFIDS internal update meeting	Hannah Ladd-Jones and Mark James	Marine Scotland policy
Mar-18	Presented at Marie Scotland Compliance Conference	Hannah Ladd-Jones, Kyla Orr (WP7) and Ali McKnight (WP7)	various members of Marine Scotland Compliance, predominantly Fishery Officers
Apr-18	Collective Review meeting of all SIFIDS Work Package and overall progress	Presentations from all Work Package team leaders	Members of Marine Scotland and chair of WC rIFG <i>Members from Marine Scotland Policy, Compliance and Science and any other teams deemed appropriate were openly invited to the meeting</i>
Apr-18	SIFIDS article published in Spring 2018 RIFG newsletter	Project Co-ordination Team and WP7 facilitators	Marine Scotland, RIFG members, SIFIDS participants and wider stakeholders and fisheries interests.
Apr-18	Presentation to Outer Hebrides RIFG Meeting, via video conference (V-C).	Ali McKnight, Kyla Orr (WP7 facilitators)	Outer Hebrides RIFG executive committee and attendees
Apr-18	Update provided at North and East Coast RIFG Meeting, Perth	Kathryn Logan (WP7 facilitator)	N&EC RIFG executive committee and attendees
May-18	Presented at West Coast RIFG Meeting, Glasgow	Kyla Orr (WP7 facilitator)	WC RIFG executive committee and attendees

Jun-18	Port visits made by facilitators at following locations recruit vessels to host observes for WP8: Mallaig, Genuig, Gairloch, Ullapool, Achiltiebuie	Kyla Orr and Ali McKnight (WP7 facilitators)	Face-to-face communication with fishers at ports
May-18	Attended and distributed information at Aberdeen Skipper Expo	Hannah Ladd-Jones and Kathryn Logan (WP7)	Public and other organisations attending
Jun-18	Poster presented at International Fisheries Observer & Monitoring Conference "Identifying fishing behaviours of inshore fishing vessels targeting crabs and lobsters around Scotland"	Mark James and Grant Course (Seascope, WP2a, 2b, 6 and 8a)	Conference attendees
Jul-18	Attended the Bi-Annual Scottish Fishing Conference 2018 for networking and disseminating the work of SIFIDS where appropriate	Hannah Ladd-Jones	Conference attendees
Aug-18	Brief update provided at North and East Coast RIFG, Perth	Kathryn Logan (WP7 facilitator)	N&EC RIFG executive committee and attendees
Aug-18	e-Newsletter issued to SIFIDS participants providing project update	Project facilitators	All SIFIDS participants
Sep-18	SIFIDS internal update meeting	Hannah Ladd-Jones and Mark James	Marine Scotland policy
Oct-18	Online SIFIDS Internal update meeting to discuss the content of SIFIDS workshop at the MASTS ASM 2018	Hannah Ladd-Jones and Mark James	Marine Scotland policy
Oct-18	Collective Review meeting of all SIFIDS Work Package and overall progress	Presentations from all Work Package team leaders	Members of Marine Scotland and chair of WC rIFG <i>Members from Marine Scotland Policy, Compliance and Science and any other teams deemed appropriate were openly invited to the meeting</i>
Oct-18	Hosted a SIFIDS workshop at the Inshore Fisheries Conference which aimed to inform attendees of the SIFIDS WPs and their results/work, and to get feedback from the industry	Led by Hannah Ladd-Jones and Mark James with presentations from all Work Package team leaders	Attendees of the workshop: fishers, Marine Scotland members, national and local fishing associations

Oct-18	Hosted evening port-side meetings / drop-in sessions in Kyleakin and Arbroath for fishers to learn about WP5 smartphone App and enrol in trial	Kyla Orr (WP 7 facilitator)	Meetings were intended for fishers, however attendance was very low (~ 2 fishers per event).
Nov-18	Hosted evening port-side meetings / drop-in sessions in Tarbert and Campbeltown for fishers to learn about WP5 smartphone App and enrol in trial	Ali McKnight (WP 7 facilitator)	Meetings were intended for fishers, however attendance was very low (~ 2 fishers per event).
Nov-18	Poster at MASTS ASM 2018 "Using mobile phone technology to capture small scale fisheries data – is this the future?"	Hannah Ladd-Jones	MASTS ASM attendees
Nov-18	Hosted a SIFIDS Workshop at the MASTS ASM to discuss the results of the SIFIDS work packages and to feedback from those in government involved in aspects of inshore fisheries management	Led by Hannah Ladd-Jones and Mark James with presentations from all Work Package team leaders	Members of Marine Scotland and chair of WC rIFG <i>Members from Marine Scotland Policy, Compliance and Science and any other teams deemed appropriate were openly invited to the meeting</i>
Jan-19	Attended the Fishing Industry Coastal Community Conference to disseminate the work of SIFIDS where appropriate	Mark James	Attendees
Jan-19	Attended Community Inshore Fisheries Alliance (CIFA) meeting in Glasgow to liaise with key members and promote SIFIDS	Ali McKnight (WP 7 facilitator)	Members of CIFA, members of Marine Scotland, the wider public and politicians.
Feb-19	SIFIDS internal update meeting	Hannah Ladd-Jones and Mark James	Marine Scotland policy
Feb-19	Collective Review meeting of all SIFIDS Work Package and overall progress	Presentations from all Work Package team leaders	Members of Marine Scotland and chair of WC rIFG <i>Members from Marine Scotland Policy, Compliance and Science and any other teams deemed appropriate were openly invited to the meeting</i>
Feb-19	Poster at Scotland's International Marine Conference "Electronic reporting and collection of data on Scotland's small-scale inshore fishing fleet"	Hannah Ladd-Jones	Public and other attendees
Mar-19	Presentation at West Coast RIFG meeting	Ali McKnight (WP 7 facilitator)	WC RIFG executive committee and attendees
Apr-19	SIFIDS internal update meeting	Hannah Ladd-Jones and Mark James	Marine Scotland policy

May-19	Attended "tackling Marine plastics through the fishing gear value" to understand the impacts of fishing gear on the environment and highlight work on vessels monitoring techniques developed in the SIFIDS Project	Hannah Ladd-Jones and Kathryn Logan (WP7)	fishers, national and local fisher association representatives, environmental groups, members of Marine Scotland and other governmental teams
May-19	Presentation at Clyde Fishermen's Association AGM	Kathryn Logan (WP7)	Clyde FA members and guests including various Marine Scotland and other agency representatives
Jun-19	Presentation (by VC) to Outer Hebrides RIFG meeting	Ali McKnight (WP 7 facilitator)	Outer Hebrides RIFG members and attendees
Jun-19	SIFIDS internal update meeting	Hannah Ladd-Jones and Mark James	Marine Scotland policy
Jul-19	Attended the Future of Fisheries National Discussion Event to participate in discussion with interests in inshore fisheries and disseminate the results of SIFIDS where appropriate	Hannah Ladd-Jones and Ali McKnight (WP7)	Attendees: members of Marine Scotland, environmental groups, representatives of national and local fishery associations,
Aug-19	Presentation at WC RIFG meeting	Ali McKnight (WP 7 facilitator)	WC RIFG executive committee and attendees
Sep-19	SIFIDS internal update meeting	Hannah Ladd-Jones and Mark James	Marine Scotland policy
Sep-19	Presentation at Solway Firth Coastal partnership meeting	Ali McKnight (WP 7 facilitator)	Solway Firth Partnership members and invitees
Sep-19	Presented at NE Coast rIFG meeting	Hannah Ladd-Jones and Mark James	Attendees: RIFG members, local fisher representatives, organisations and Marine Scotland members
Sep-19	Presentation at Solway Firth Partnership Sub-group meeting	Ali McKnight (WP 7 facilitator)	Solway Firth Partnership - sub group members
Sep-19	Presented a talk at the Seafish UKFEN inshore fisheries socio-economic symposium summarising the results of WP 4 and discussing other results of the SIFIDS Project	Hannah Ladd-Jones and Andrew Parker (Imani, WP4)	Members of inshore fishery research group, socio-economists, environmental groups, representatives of national and local fishery associations
Oct-19	Attended Priority Marine Features Review meeting, Edinburgh, to share information	Ali McKnight and Kyla Orr (WP 7 facilitators)	Delegates representing multiple organisations

Oct-19	2 x posters at MASTS ASM - "Low-cost solar trackers – how off-the-shelf equipment can be used to collect data from small-scale fisheries" and "The feedback loop – providing Scottish inshore fishers their unseen data "	Rene Swift and Swithun Crowe	MASTS ASM attendees (including Hannah Ladd-Jones and WP7 facilitators networking.)
Oct-19	2 x presentations at MASTS ASM - "Factors affecting small scale fishers' behaviour in Scotland" and "The Scottish Inshore Fisheries Integrated Data System - what has been achieved?"	Janneke Ransijn and Mark James	MASTS ASM fisheries session attendees
Oct-19	Presentation at 'International Conference of Oceans Governance in Archipelagic Regions' about the Governance for sustainability highlighting the results of using low-cost trackers as a cost-effective system for managing small-scale fisheries using SIFIDS work as an example	Mark James	Conference attendees
Oct-19	Attended the Seafish 'Future of Our Inshore Fisheries' Conference to distribute information about the SIFIDS Project	Hannah Ladd-Jones	Attendees: inshore fishery researchers, environmental group representatives, fishers from across the UK, representatives of national and local fishery associations
Oct-19	Presented at SNH's 'Understanding Fish in Inshore Waters' workshop about SIFIDS technological developments and results from initial trials	Hannah Ladd-Jones	Attendees: fishery researchers, SNH members, governmental environment teams
Oct-19	Presented at the Berwickshire Shellfish Symposium discussing the results of the SIFIDS project	Hannah Ladd-Jones	Attendees: local fishers, fishery researchers, representatives of national and local fishery associations and teams
Oct-19	Presented at Peru's National Innovation Program on Fisheries and Aquaculture the innovative technological solutions SIFIDS had developed for management small-scale fisheries	Mark James	Attendees: fishery researchers from South American countries and around the world, representatives of national and local fishery associations

3.3 Videos Commissioned as final project communication materials

Six short videos were commissioned (5-7 minutes long), which provide an easily accessible overview of key Work Packages with an explanation of methods and main findings, and also include commentary from fishers that took part.

Local photographers / film makers were sub-contracted to assist with the filming work, including UHI Film & Media students in North West Highland, Orkney and Shetland. Drone and additional interview video material was provided by the PCT. The facilitators undertook much of the editing and post-production work to ensure pertinent points were included.

The videos will be uploaded onto the project website as well as the MASTS YouTube channel, and disseminated to SIFIDS participants, fishery industry contacts and via social media once finally approved for release. These videos are expected to provide ongoing information and generate further feedback.

The videos are as follows:

- i. **SIFIDS Overview.** A short synopsis of all the SIFIDS research projects (Work Packages) and how they may be used to improve fisheries management, with brief commentary from fishers and researchers.
- ii. **WP2: On-Board-Central-Data-Collection-System.** This film features a fisher from Plockton who actively participated in the project for more than 2 years. He explains what equipment he had installed on his vessel, and how it automatically collected vessel track data (GPS) and recorded when and where his fishing gear (creels) was being deployed and retrieved.
- iii. **WP2: Scanner for automatically determining size and sex of crabs and lobsters.** The film documents the scanner being trialled on board a fishing vessel in the Solway and explains how the equipment could be used to rapidly collect data for stock assessment purposes, including dialogue from the participating fisher.
- iv. **WP3: The exploration of automatic detection of scallop stocks.** A detailed overview of how automatic detection techniques were trialled to record scallops on the seabed, including side-scan sonar (to record bathymetry), drop-down video and diver surveys combined with machine learning. Featuring a Director of Keltic Seafare (shellfish buyer / processor), who helped with the research and diving work.
- v. **WP5: Smartphone App for recording FISH1 data and marine observations.** This explains how a prototype Smartphone App was developed by the University of St Andrews and was trialled by a number of fishers around Scotland. Featuring interviews with a fisher who used the App to submit his catch and landings data, as well as the Chair of a local fisher's association.
- vi. **WP6: Online platform.** The video outlines the online graphic user interface developed to display filtered fisheries management data to stakeholders (fishers, managers and regulators). The video features a step-by-step approach on how the platform works and highlights how better data access could help fishers manage their local fishery.

All completed videos can be found on the SIFIDS project website (<https://www.masts.ac.uk/research/emff-sifids-project/>) and the MASTS YouTube channel (<https://www.youtube.com/channel/UCYyYvBMsAM2MEjshrMOsMtg/featured>) .

3.4 Newsletter

As well as an interim e-newsletter issued in August 2018, a final SIFIDS newsletter was produced at the end of 2019 for issue as both a hard copy and e-format (PDF). The newsletter

provided a summary of the project outcomes and feedback from the fishers and others involved³. It also includes links to project videos, published papers etc.

Copies will be available at all Fishery Offices and distributed to main Marine Scotland offices, RIFG chairs, etc.

3.5 Journal Publications

Three peer-reviewed papers were published based on the outcomes of the SIFIDS project:

- James, M., Mendo, T., Jones, E. L., Orr, K., McKnight, A., & Thompson, J. (2018). AIS data to inform small scale fisheries management and marine spatial planning. *Marine Policy*, 91, 113-121. <https://doi.org/10.1016/j.marpol.2018.02.012>
- Mendo, T., Smout, S., Russo, T., D'Andrea, L., & James, M. (2019). Effect of temporal and spatial resolution on identification of fishing activities in small-scale fisheries using pots and traps. *ICES Journal of Marine Science*. <https://doi.org/10.1093/icesjms/fsz073>
- Mendo, T., Smout, S., Photopoulou, T., & James, M. (2019). Identifying fishing grounds from vessel tracks: model-based inference for small scale fisheries. *Royal Society Open Science*, 6(10), 191161. <https://doi.org/10.1098/rsos.191161>

4 CONCLUSIONS AND SUMMARY OF LESSONS LEARNED (WP7):

4.1 Communications

Contact via mobile phone or SMS seemed to be a preferred means of communication for many fishers, (or generated more direct response than email) but raised the issue of difficulties in accessing contact details / Data Protection restrictions.

Regional Inshore Fisheries Groups (RIFG) provided an important means of disseminating information to the fishing industry, including presentations at RIFG meetings and support by RIFG chairs in circulating information to members with a request for this to be cascaded to individual fishers.

The Fishery Officers (FO) provided valuable support by giving facilitator contact details to fishers, alerting fishers to information about the project, and helping to identify individuals with appropriate size/geared vessels that might be willing to take part. Without the FO engagement, the number of participant fishers would have been less or would have required significantly more effort to achieve.

The 0800 Freephone number provided to contact the facilitators was not well used. This was likely due to a combination of SIFIDS not offering 'free' equipment (as in the EFF project) and having a diverse range of sub-projects leading to a different approach to fishers often involving facilitators on a one-to-one rather than a single, large promotional effort (advertising the freephone number).

Ensuring fishers were kept up to date and informed of progress was absolutely key – many individuals stated that they had taken part in various previous study programmes whether through government or other bodies but received no feedback about the results. For that reason, it is essential that updates containing the SIFIDS results were sent, preferably with a

³ The final newsletter will be uploaded onto the SIFIDS Project website: <https://www.masts.ac.uk/research/emff-sifids-project/>

personalised email. Good feedback and ensuring industry can 'use' results is a valuable outcome that should be promoted.

Good communications between the facilitators and the project co-ordination team was very important and included regular joint (telephone / Skype) meetings to assess progress and set forward plans, with open two-way communications for suggestions, queries etc. This enabled a clear work and management structure that gave flexibility without the need for micro-management.

4.2 Encouraging Fishers to Participate:

All fishers in the project took part voluntarily and no financial incentive was offered, but some background comments were either expressed to the facilitators or relayed by the FOs about fishers being 'expected' to help by hosting various researchers etc., with no recompense for their time or effort especially where this impinged on their earning time. Equally, a significant number of participants were genuinely committed to helping the project for their own interest and in the hope of wider industry benefits accruing in future.

For WP8 where the objective was to recruit over 100 vessels to host observer trips, it was particularly challenging to recruit enough numbers from the 17 target ports initially selected by researchers. This was exacerbated by the fact that some vessels operated from different ports to those named on the national database, and researchers wanting clusters of trips in one area to minimise travelling-time. After several months the WP8 methodology had to be 'relaxed' and some reserve ports were added in order to recruit the desired number of participants. It was unfortunate that facilitators had to refuse several volunteers who were not in 'target' port areas but wanted to participate in the project.

It is felt strongly that the offer of a small incentive or token of appreciation, such as a chandlery voucher, might well have significantly increased the number of participants and saved the facilitators a lot of time in recruitment to achieve the target levels.

4.3 Assurances Given To Fishers Before Participating:

An important feature of obtaining fishers' consent to participate in SIFIDS was the assurance given that the raw information and data etc. gathered as part of the project would remain confidential within the project and would not be passed to Marine Scotland for compliance purposes. This was particularly important with regard to the observer trips, and any anecdotes that may have been relayed to staff during conversations. It is essential for any future work that the trust placed in the project is not called into question, and that the final reporting reflects this position. The concept of SIFIDS was to develop systems that could relay more detailed information direct to Marine Scotland or regulators in future, so it is important that the final reporting distinguished between what happened as part of the project, and what could happen in future if such a system is adopted.

4.4 The Facilitation Team:

The three team members, Kyla, Ali and Kathryn, worked well together and were able to spread the load and ensure coverage over the period. Some elements that evolved or were introduced as the project developed were presented to the facilitation team as a fait accompli, whereas more input at the pre-design stage might well have suggested a slightly different approach and would have helped the facilitators be a more inclusive part. The design of the mobile phone App was an example, where a more structured approach could perhaps have saved the app designer time regarding the actual FISH1 form contents, mandatory fields etc.

5 APPENDICES

5.1 Attainment of Key WP Milestones / Objectives

Objective	Level of completion		
	80%	90%	100%
Objective 1 - Confirm clear project deliverables and deadlines for WPs with each Contractor			X
Objective 2 - Establish a working plan (dates/times) to regularly communicate with PCT to discuss day-to-day management of the project			X
Objective 3a - Recruit 15 inshore vessels to participate in WP2A sea trials			X
Objective 3b - Recruit 50 vessels to participate in WP2B (survey undertaken by Seascope during WP8 Trips).			X
Objective 3b - Recruit a subset of 101 inshore vessels (equipped with AIS via the EFF project if possible) to participate in WP8			X
Objective 4a - Distribute WP4 surveys to fishermen and industry bodies on project Facilitator emailing list			X
Objective 4b1 - Recruit at least 100 fishermen to participate in WP5's mobile phone application trial. (See Note 1 below)	X		
Objective 4c2 - Gather feedback about the mobile phone application from fishermen who participated in WP5's trial			X
Objective 4d - Collate survey results recording inshore fishermen's reactions/feedback to the potential data collection strategies and technology identified under WP1 and WP2. (See Note 2 below)		X	
Objective 5a - Attend min. six meetings of the IFGs and key Fisherman's Associations to provide update on project progress.			X
Objective 5b - Organise min. 10 meetings in ports where project vessels are based to ensure participating fishermen are kept updated on project progress (particularly WP2 and WP8 pilot area/s). (See Note 3 below)		X	
Objective 5c - Attend the Scottish Inshore Fisheries and Annual Scottish Fisheries Conferences to publicise the project. (attended:- 2017 and 2018 Scottish Inshore Fisheries Conference, 2017, 2018 & 2019 Skippers Expo Aberdeen and 2018 and 2019 MASTS Annual Science Meeting)			SIFC x 2 Skippers Expo x 3 MASTS ASM x 2
Objective 6 - Create and maintain project mailing list of involved/interested parties			X
Objective 7 - Provide Ongoing support to fishermen involved in the project and lend assistance to individual fishermen in understanding the			X

outputs of the project, either via written media, telephone or face-to face interaction.			
Objective 8 - Assist project Contractors of other WPs in liaising with and co-ordinating meetings with relevant Inshore Fisheries Groups (IFGs), fishermen's federations and working groups, industry participants and other key stakeholders			X
Objective 9 - Provision of regular written feedback (via email) to members of other WPs and the PCT on the progress/issues encountered during facilitation plus appropriate recommendations to ensure positive relationships with fishermen involved			X
Objective 10 - Draft and submit final report describing facilitation activity undertaken with assessment of its effectiveness, incorporating industry feedback on the project outputs.			X

5.2 WP7 Facilitators - Ethical guidelines adopted for communicating with stakeholders and conducting surveys/ interviews

Members of the relevant fishing community and other stakeholders should be given equal opportunities to engage with / comment on the project, regardless of their affiliation to specific Fishing Associations, Organisations or Federations.

When engaging with industry (fishermen), Facilitators will be sensitive to local issues and politics, will remain neutral/unbiased, and should not side with or show allegiances with the views of any one fishery sector.

Confidentiality and anonymity: Participants names and contact details will be strictly confidential and not shared with third parties unless previously agreed in writing. Participants should not be specifically named in the presentation of results, unless they have given prior written consent (in most cases results will be aggregated). Any information or opinions supplied by a participant in a private setting should not be shared with other participants (unless consent is given).

Participants will be advised that information given to any of the joint WP7 Facilitators (AM/KO/KL) will be shared with / accessible to the other WP7 Facilitators and SIFIDS project partners where required as part of the project.

When conducting interviews / surveys or holding workshops, the procedure will be explained to the participants beforehand, and the participants will be told if the meeting is being officially recorded (minutes taken).

Prior to conducting an interview/survey, the interviewee should provide consent/approval for their contributions to be recorded in an agreed format (e.g. written form, voice recording). If the material is to be published or used for a public resource, then the interviewee must give explicit approval (preferably written). Point 3 above will apply.

Participants should be given as much notice as possible for undertaking surveys / interviews, however it is acknowledged that some may be arranged at short notice if this suits both parties.

When conducting interviews or holding workshops, the interviewees and Facilitators should be comfortable with the location of interview / workshop and should be offered an alternative if requested (private / public).

Should the Facilitators need to conduct interviews or surveys 'in the field', they should be aware of any personal safety or lone working issues. Information on places to be visited and contact details should be left with a friend / colleague.

As far as possible, the Facilitators will keep participants informed on the progress and outcomes of the research and recognise that their interactions with fishing communities may not cease on the exact date project funding ends (there is likely to be a tailing off-period for communications).

Facilitators will endeavour to respond rapidly to any project queries from the fishing industry or other stakeholders, and if they are unable to answer the query directly then it will be referred onwards to the appropriate persons/organisation.

5.3 SIFIDS Newsletter sent in August 2018 to project participants (3 pages)

AUGUST 2018

ISSUE 1

SIFIDS NEWS

CONTACT US

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INTHISISSUE:

OBSERVATION SEA TRIPS -THANK YOU!

MOBILE PHONE APP / E-FISH FORM

INSHORE FISHERIES CONFERENCE 2018



SIFIDS
Scottish Inshore Fisheries
Integrated Data System

Observation Sea Trips 2017/2018 - Thank you!

A big thank you goes to all who supported Work Package 8A by having a SIFIDS researcher on board your vessel during 2017 and 2018. We are very pleased to say that with your help we have now met our target of over 130 sea trips (see distribution below).

The information gathered will provide a much clearer picture of how 12 meter and under static gear vessels and crews operate when fishing and recording the composition of their catch. This, in turn, will help SIFIDS ensure the development of the prototypic 'on-board data management system' and data recording apps (that are part of the overall SIFIDS objectives) is practical and workable.

The areas involved and the number of trips completed were:

	Summer trips	Winter trips
Outer Hebrides	17	-
Argyll	17	7
West Highlands	24	3
Outer Moray Firth	5	-
North East	21	11
Forth and Tay	17	10
TOTAL	101	31

Continued...





Thank you also to those skippers/owners who have agreed to further this work by taking part in Work Package 2A, which aims to test the 'on-board data capture system' which will collect data from a variety of automated onboard sources.

Your trips have been invaluable for the researchers and equipment testing.

Observation Sea Trips continued

31 skippers hosted two trips (one summer and one winter) to provide a valuable comparison, so an extra thanks goes to those of you who permitted this for your additional time and input.

You have told us that the researchers succeeded in minimising any disruption to your normal fishing activities, but we appreciate there is always some time required before, during and after trips so we very much appreciate your help.

Due to the early gales, the late start to the season and to minimise travel time / costs, the observers unfortunately were unable to complete a trip with everyone who volunteered, but we are grateful for your offer and hope there may be an opportunity for you to take part in another project element.

Smartphone App / e-FISH 1 Form

Information will be coming soon about a prototype (Android) mobile phone application we are developing which you may be interested in trialling (Aug - Nov 2018). Under the trial, skippers of 10 meter and under vessels will be able to:

- Complete an **electronic FISH1 form** and email this direct to their Fishery Office via their phone;
- Use an **optional GPS tracker** to record co-ordinates when fishing starts and automatically insert these and the ICES square on the form; and
- Record any **sightings or observations** on a range of marine species.

Fishermen helped to shape the app by giving their views on the usefulness of different features and as a result we are now working with the Fishery Offices to check the e-FISH1 form meets their requirements.

Please email us at SIFIDS.app@gmail.com or contact the SIFIDS Freephone helpline- 08000 433474 for more information.



Inshore Fisheries Conference 2018

Have your say on how Scotland's inshore fisheries are managed!

FREE Registration is now open for the Scottish Inshore Fisheries Conference being held in Inverness on Friday 5th October.

As well as the plenary and networking sessions, there are four breakout sessions including a presentation on next steps by our SIFIDS team. You can choose to attend two of the four:

- What Coastal Fishing Communities Can Bring to Science, Sustainability & Governance
- The potential of low impact fishing for Scotland
- Implementing the Scottish Inshore Fisheries Integrated Data System
- Improving Inshore Fisheries Data

We hope to see you there. For more details and to register please visit <https://t.co/WYYTPNc5mL>



**SCOTTISH
INSHORE FISHERIES
CONFERENCE 2018**

**5th OCTOBER 2018
EDEN COURT
INVERNESS**

Join us for the fifth Scottish Inshore Fisheries Conference at Eden Court, Inverness on Friday 5th October 2018, and have your say on how inshore fisheries are managed!

The theme of this year's conference will be the future of fisheries management in Scotland, and a range of interesting topics will be up for discussion. Fergus Ewing MSP, Cabinet Secretary for the Rural Economy and Connectivity, will be in attendance to open proceedings and give the keynote speech.

The conference is an ideal opportunity to meet people from around Scotland and beyond with an interest in inshore fishing. Active fishermen are encouraged to attend and share their knowledge and experiences with others in an informal setting.

Delegate registration will open in July, and we look forward to welcoming you to the 2018 Scottish Inshore Fisheries Conference in October.



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5.4 Summary SIFIDS round-up newsletter (16 pages)



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SIFIDS News – End of Project Reporting (2016- 2019)

January 2020

A BIG THANK YOU!

The SIFIDS team warmly thanks the many individual fishers, groups and organisations who have contributed to the success of the SIFIDS project. Support and feedback from fishers, industry representatives, Marine Scotland staff and many other stakeholders around Scotland has been pivotal to the SIFIDS Project carrying out wide-ranging work to identify ways to improve data collection across the inshore fleet. Over 130 vessel skippers in 43 ports around Scotland hosted research trips, while others have undertaken longer-term trials including GPS tracking, gear sensing or shellfish scanning devices. Many more took part in the socio-economic and online surveys and several fishers contributed significantly to equipment and software development.

Main Project Outcomes and Recommendations

- A possible blue-print for an integrated, secure and cost-effective system of data gathering and sharing to empower fishers and managers;
- New, prototypic technology to automate data collection and minimise reporting burdens e.g.
 - simple low-cost GPS tracking equipment trialled, with solar-powered options;
 - linking GPS tracks, gear deployment sensors and catch data to assess fishing intensity and Catch Per Unit Effort;
- A world-first prototypic crab and lobster scanner capable of determining the sex and size of live animals at-sea;
- Proposals to enhance methods of shellfish stock-assessments and scallop habitat monitoring;
- Combining socio-economic data with fishing drivers to inform policy and business planning.



Why Do We Need to Improve Data?

Accessible data on the location of fishing, fishing effort, and more timely stock assessments are required at a finer spatial resolution to improve local fisheries management, to fulfil compliance regulations and to help ensure that stocks are sustainably managed. The concept of adaptive management can only be realised when individual fishers and associations also have data needed to monitor and enhance the performance of their own businesses and demonstrate good practice.

A key priority of the Government's Scottish Inshore Fisheries Strategy and Regional Inshore Fisheries Groups is to acquire better data through the inshore fleet. Scotland's National Marine Plan, while recognising the importance of the inshore fishing industry to local communities, to Scotland's economy and future food security, underlines the wider range of cross-sectoral data requirements.

It is crucial that any systems and processes designed to address these requirements are proportionate and appropriate for use on inshore vessels. A fundamental principle of SIFIDS has been to identify options that use open-source software and off-the-shelf technologies – minimising the cost and retaining a lot of future flexibility to adapt and develop optimal data collection and analysis solutions.

Policy, Legislative and Regulatory Context

The Scottish Government's Programme explicitly identifies as a priority the modernisation of the Scottish inshore fisheries fleet, including the deployment of technologies such as remote electronic monitoring (REM) for scallop fishing vessels and the introduction of tracking systems across the inshore fleet (<https://www.gov.scot/publications/protecting-scotland's-future-governments-programme-scotland-2019-20/>).

The Regulation of Scallop Fishing (Scotland) Order 2017 (RSFO), prescribes for scallop dredge vessels operating in Scottish waters, the specification for REM equipment and its functionality (http://www.legislation.gov.uk/ssi/2017/127/pdfs/ssi_20170127_en.pdf).

It is likely that in the near future the Scottish Government will require all Scottish-managed commercial fishing vessels under 12m in length, operating in Scottish waters to carry some form of basic tracking device. Some vessels may also be required to carry additional equipment for detecting when gear is deployed and retrieved.



The SIFIDS 'Integrated Data System' Model

The combined results of all the SIFIDS work packages have enabled us to identify a comprehensive package of protocols offering a partially-automated, integrated, cost-effective and low-maintenance system of data collection and reporting. We believe this could meet the requirements of government and the fishing industry, without overburdening fishers in terms of reporting.

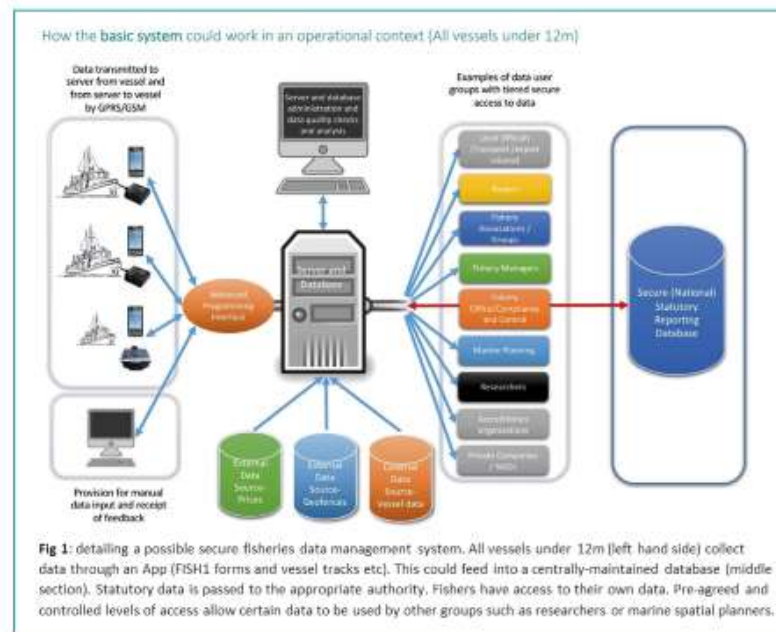
This combined data system offers an approach that would involve fishers in the central provision of data needed for the future sustainability of the sector and provide rapid feedback to fishers for dynamic and adaptive management. However, this approach would require a step-change in current practice and thinking.

Understandably the majority of fishers prefer that their data remains confidential. By using mobile phone technology, GPS tracks and other data can be transmitted to a secure database that would provide

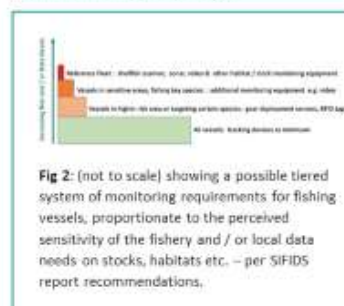
fishers with access to their own data. An agreed level of access to data would then also be required for statutory/regulatory purposes. Fishers could also elect to provide others with access to their data for operational and business reasons.

The model proposes 5 main advances:

1. **Installing simple GPS tracking systems** on all under-12 metre inshore fishing vessels to provide better information on fishing location and effort, in conjunction with the current statutory records of landings and gear deployed. Ideally, an App, similar to the FISH1 mobile phone App that was developed as part of the SIFIDS project, would be used to provide a daily record of catch as well as landings. (This minimum level of data is expected to provide sufficient information for the majority of the inshore fleet in Scotland, c. 1500 vessels)



2. **Using gear-sensors** to demonstrate when and where gear is being deployed or recovered, for example on some vessels using specific gear types, and/or operating in a sensitive area. SIFIDS trialled off-the-shelf RFID tag sensors, induction sensors, mechanical and hydraulic-hauler sensors. These devices (used in tandem with our On-Board Central Data Collection System (OBCDCS) which has GPS, GPRS and high data storage capacity), can provide near real-time data on when and where individually-identified gear or strings/fleets of gear are deployed or recovered. The extent of reporting or monitoring would be proportionate to the 'risk' level, or overall data needs of the fishery managers (see Fig 2).



3. **Establishing a small 'reference fleet'** to collect data that could assist stock assessments. The fleet would consist of selected fishing vessels that would

carry the OBCDCS, gear sensors and occasionally, an operational version of the prototypic Automated Species, Sex and Size Identification System (ASSSID - see below). This system can provide the necessary data for basic stock assessment.

4. **Developing low-cost, non-invasive methods to identify scallop grounds**, that could be deployed from an inshore fishing vessel. SIFIDS tested a range of techniques including state-of-the-art sonar which demonstrated that scallop grounds can be identified non-invasively. However, a simple collapsible tripod equipped with a Go-Pro-like video camera (drop-down camera) has proven an effective and cost effective option and is, in principle, capable of recording images of scallops on the sea floor which could then be analysed automatically using Artificial Intelligence (AI). A suite of 4,000 scallop images is currently being used to "train" the AI system. If successful, further testing of the drop-down camera system and the trained AI system will be needed to confirm whether it will work effectively for scallop stock-assessment purposes.

5. **Creating a secure, relational database** with a simple user interface (visual display) to allow different user groups to access data in different ways e.g. fishers would see only their own data, MS Compliance could see data required for statutory purposes while fisheries managers and others would see aggregated, anonymised data.

Detail on each component is given across the next 3 sections.

GPS Tracking Trials

The SIFIDS project has built on the results of earlier projects trialling AIS reception and functionality around Scotland (including the 'Establishing the Location of Fishing Activities within Scotland' project (2014-2016) funded through the European Fisheries Fund (EFF)).

SIFIDS investigated the use of simple GPS units, connected to mobile telephone (GPRS) technology, to transmit vessel locations securely, rather than AIS which broadcasts location information using a radio signal that can be picked up by anyone with a receiver. After reviewing some of the IVMS technology available and conducting tests with simple GPS trackers, SIFIDS focused on tracking devices used widely in the road transport sector. As the tracking of commercial vehicle fleets takes place on a global scale, there are many well-tried, robust, and mass-produced tracking units. These sophisticated systems have excellent technical support, are produced in large numbers and are relatively inexpensive. For testing purposes, SIFIDS used Teltonika FMB202 and FMB204 tracking units. For vessels with reasonable power supply, the unit can be fitted directly to the vessel's ignition system. For vessels with poor or no power, a solar-powered version of the tracker has been developed.

Critical to the choice of tracking system was the ability to purchase inexpensive, but well documented and accessible hardware that is not limited by the licence conditions or costs associated with many commercial IVMS and fleet tracking systems. This approach enables the use of open-source software solutions to acquire the data from the tracking devices and to store, process, analyse and display the outputs with complete flexibility.



SIFIDS Newsletter

Results are very encouraging, and units seem to be easy and quick to fit, reliable and inexpensive to use. The solar system trials have provided important feedback which continues to inform ongoing trials over the winter period when low levels of sunlight and low temperatures might be expected to affect battery charging and endurance. The ability to put the tracking devices into "hibernation" when not in use is key to conserving battery power. Further field testing will allow us to refine the way the solar system operates to ensure that it functions seamlessly throughout the year.

Potential Benefits of GPS Tracking for the Industry:

- Allows fishers to accurately document their ongoing use of fishing grounds, important both for fishery management and compliance purposes, and to inform other potential marine users (e.g. demonstrating fishing activity for marine renewable energy developments, aquaculture and Marine Protected Areas).
- GPS tracks are transmitted via mobile phone (GPRS) technology and are not visible to other vessels or to the public, therefore fishing locations remain confidential.
- The track data can be stored (on the tracker) and automatically transmitted when in mobile signal range.
- Cheaper and more flexible to use than AIS, important if we are to maximise the potential to use vessel track data as outlined below.
- Units can be programmed remotely, therefore require minimal attention.
- Vessel track-analysis can predict where gear has been hauled, potentially addressing some of the challenges around gear conflict.
- Catch Per Unit Effort calculations can be produced, by combining vessel track-analysis with submitted weekly FISH1 forms.
- GPS track data could help show the provenance of catch for MSC or other certification schemes.

Final project reports and video: <https://www.masts.ac.uk/research/sustainable-scotland-inshore-fisheries/>

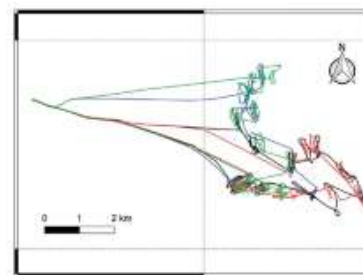


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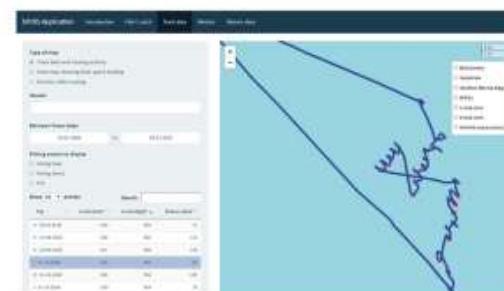
What can a GPS Track tell us about Fishing Activities?

SIFIDS researchers undertook 135 sea trips on static gear vessels around Scotland, thanks to 117 skippers who volunteered to help, with some hosting both a winter and summer trip. Researchers made detailed, timed observations of the different vessel activities, including steaming, shooting and hauling gear, whilst recording a GPS track. SIFIDS then compared the timings of hauling and shooting activities with the GPS tracks to analyse typical or "signature" patterns of movement, turning angles and speeds when hauling or shooting gear.

As a result, a computer model was developed which has proved to be over 96% accurate in estimating the true spatial extent of creel-fishing activity from GPS tracks alone, (given a 100 metre margin of error). What this means is that by simply collecting and analysing track data it is possible to predict when and where static gear is being recovered.



GPS tracks



Analysed GPS tracks predicting when hauling activity occurred (red sections)

SIFIDS Newsletter

So far, the computer model has only been tested for creel fishing activity. However, a short extension of the project enabled a further fifteen observer trips to be completed on nephrops trawl and scallop diving vessels and this data is in the process of being reviewed to see if other fishing methods also show signature vessel movement patterns.

It takes a fraction of a second for the track data from one vessel to be computer-analysed, so the entire inshore fleet's track data for any one day could be analysed in a few seconds. More detailed information is now available in published scientific papers (e.g. Mendo et al., 2019). In addition to providing information

on where fishing is taking place, it is also possible to estimate the number of creels being deployed and the soak time of the gear, providing important measures of "effort".

GPS 'Ping' rates

The GPS trackers used can be set to record a location ('ping') every second, but we discovered that a 'ping' once every 60 seconds provides enough information about creel-vessel movements to accurately estimate activity, without recording (and transmitting) unnecessary data. Other fishing gears may require a different 'ping' rate.

A short project video about the interpretation of GPS tracking is available at <https://youtu.be/E2Pc9g2cH9k>

Mendo, T., Smout, S., Russo, T., D'Andrea, L. & James, M. (2019). Effect of temporal and spatial resolution on identification of fishing activities in small-scale fisheries using pots and traps. *ICES Journal of Marine Science*. <https://doi.org/10.1093/icesjms/fsz025>

Mendo, T., Smout, S., Photopoulou, T. & James, M. (2018). Identifying fishing grounds from vessel tracks: model-based inference for small-scale fisheries. *Royal Society Open Science*, 15(10), 181161. <https://doi.org/10.1098/rsos.181161>

James, M., Mendo, T., Jones, E. L., Orr, R., McKnight, A. & Thompson, J. (2018). AIS data to inform small-scale fisheries management and marine spatial planning. *Marine Policy*, 91, 112-121. <https://doi.org/10.1016/j.marpol.2018.02.012>

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Calculating Fishing Effort Through Gear Deployment Sensors

Where it is considered necessary, additional equipment can be used in conjunction with a GPS track such as RFID (Radio Frequency Identification) tags and induction sensors to show exactly when and where gear is being used, as well as to count the number of pots being hauled.

SIFIDS has trialled the fitting of RFID tags to creel fleet buoys, which were swiped past an RFID reader during hauling to identify each creel fleet. Induction sensors that detect when a creel is brought onboard were also tested, providing an accurate creel count for each fleet. Sensors were also attached to haulers to record when they were in operation. All data was collected via the On Board Central Data Collection System (OBCDCS), which contains a GPS tracker connected to the sensors, providing an accurate time and position for gear deployed or recovered. Data was then sent via mobile telephone (GPRS) network to a central, secure computer server to be analysed and made available to the fisher. In an operational system, such data would, where appropriate,

also be sent to the Fishery Office or to contribute to (anonymised) national statistics.

Tracking data can be particularly useful in providing estimates of Landings Per Unit Effort (LPUE) by combining data on the predicted duration of time spent fishing, the amount of gear being used and the weekly FISH1 catch landings information submitted to Fishery Offices. Adding data collected on discards (such as undersized or berried lobster and crab) then provides Catch Per Unit Effort (CPUE). CPUE offers those involved in fishery management a clearer understanding of the fishing pressures and status of the targeted stock, and to determine if they are being fished to 'Maximum Sustainable Yield'. This is work in progress and the SIFIDS team are investigating if CPUE information could be used along with weather, temperature, fuel cost, catch price etc., to help fishers understand how their businesses are performing and perhaps inform decisions about the way they operate.



The Onboard Central Data Collection System installed on the wheelhouse of a vessel



The Onboard Central Data Collection System installed under the winch of a vessel, tracking the hauling of the vessel

Electronic Reporting via a 'FISH 1' Mobile Phone App

Fishers have called for simpler ways to log their mandatory catch information and SIFIDS rose to this challenge by developing a trial FISH1 Form Android smartphone App. Furthermore, fishers gain valuable scientific and environmental knowledge at sea and it is important that their observations can be recorded in a more scientific way and taken into account as part of managing the fishery.

SIFIDS combined these two reporting needs into one mobile phone and tablet App to:

help fishers complete and submit their FISH1 forms quickly and accurately to the Fishery Office; and enable easy and structured reporting of environmental and ecological observations of interest.

Examples of observations that could be recorded on the trial app were sightings of non-native, protected or endangered species (e.g. triggerfish, John Dory, wrasse, octopus and dolphins). Future versions would enable wider observations such as squid eggs on creels, soft shells on crabs and berried females, sightings of algal blooms or jellyfish swarms, fish spawning areas, or anything else of particular note.

To save fishers time, standard information for the FISH1 form such as the vessel, skipper and owner details, gear type and quantity, buyer registration number, target species etc. was entered only once to the App which automatically populated each week's form, with a facility to amend as required.

An optional GPS tracking function was built into the App to record the start of each fishing area. This automatically entered the specific latitude and longitude readings into the FISH1 form which saved fishers time in completing their returns.



The App became available for trial at the end of 2018 as an Android version and was trialled by twelve fishers, seven of whom regularly sent in their FISH1 forms under a special arrangement with the Fishery Offices.



Benefits reported by the fishers who used the App included:

- improved accuracy in their FISH1 forms
- submitted FISH1 forms on time
- daily catch data easy to access
- if used with tracking option it could potentially provide evidence of gear location

Feedback was very positive with various suggestions from fishers as to how a next version of the App could be enhanced such as:

- integrating with movement and export documents (digitised)
- the option for nominated data-sharing between partner boats or boat and processor
- showing MPAs or other sensitive areas on the map
- adding a geofence so the App starts automatically when the vessel leaves the port
- showing coloured tracks to distinguish between fishing and steaming
- provide a weekly spreadsheet with a summary of each day's data to allow future comparison
- adding more species to the observation list
- bigger on-screen buttons for easier use at sea

A short video provides an overview and fishermen's feedback on the trial app: <https://youtu.be/5wCjciHPvYU>

Reference Fleet for Stock / Environmental Data Collection

While SIFIDS has recommended that the majority of vessels would only need a GPS track to provide sufficient data for compliance purposes and to estimate basic effort, we also propose that fishers should be involved in the collection of biological data to feed into stock assessments. A small proportion of the fleet could, where appropriate, have the OBCDCS system together with the Automated Species, Sex and Size Identification (ASSSID) device.

On-Board Central Data Collection System (OBCDCS)

An essential part of the integrated data system is the capacity to collect, store and forward a range of vessel position, fishing activity, effort and other data streams relevant to fisheries management.

SeaScope Fisheries Research developed an On-Board Central Data Collection System (OBCDCS) using 'off the shelf' components. This had to be easy to install and maintain, of low capital and running cost and require minimal power. The system developed provides a standard platform for the acquisition of sensor data and transmits both position and sensor data ashore using mobile phone networks. The system has the ability to accommodate a wide variety of sensors, and links that data with the position and time information.

Thirteen OBCDCS units were built and tested on board volunteer host vessels for up to a year, during which time the system logged over 35 million individual positional 'pings'. Skippers provided invaluable feedback on overcoming various design and operational challenges.



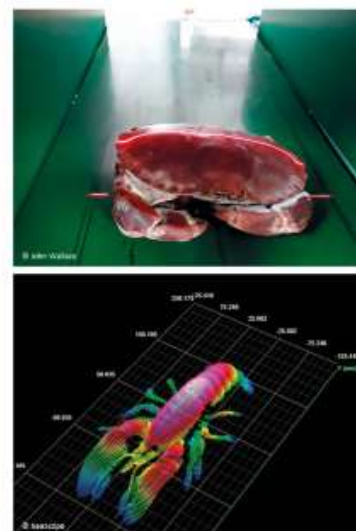
The RFID tags and inductive sensing kit developed was trialled on 5 vessels. This short video shows the system in operation: <https://youtu.be/eS-H-CdzrNw>

SeaScope's report identifies how these systems could be further developed and tested as part of a larger-scale

roll-out (Report reference: Ayers R., Course G.P. and Pasco G.R., 2019. *Scottish Inshore Fisheries Integrated Data System (SIFIDS): Development of an Autonomous Fisheries Data Harvesting System and Investigations into Novel Technological Approaches to Fisheries Data Collection*).

ASSSID

The Automated Species, Sex and Size Identification (ASSSID) kit is a prototypic automated system created by SIFIDS team SeaScope Fisheries Research to sex and measure common lobster and brown crab. The device contains a conveyor system and a 2D laser scanner, which captures and builds a 3D image of the animals passed under the laser on the small conveyor belt. The image is then analysed by bespoke software to rapidly identify the animal (crab, lobster or other), its carapace measurements and its sex. As stock assessments are time-consuming and expensive, the device was designed to be highly portable and can be installed either harbour-side to analyse landings or on the back of vessels to quickly analyse entire catches, or discards if required.



The ASSSID device can be linked to the OBCDCS to provide a date, time and GPS stamp for each animal scanned before it is either retained or discarded.



Database with User-Friendly Visual Interface for Selected Users

SIFIDS developed a database and an online, easy-to-use interface that would allow different user groups to access data in different ways depending upon the privileges granted to them i.e. a fisher would only be able to see their own data, MS compliance would also see data required for statutory purposes, fisheries managers would see aggregated and anonymised data. This system enables data to be entered once and used multiple times, with controlled access to permit data-sharing while ensuring the confidentiality of individual fisher's data. The interface could provide the Scottish Government and industry with controlled access to meaningful and timely management information in the format required. The ambition is to enable users to interrogate data or to have data and other useful information pushed to their mobile phones or other devices.



Review and Optimisation of Shellfish Data Collection Strategies

Whilst SIFIDS has been developing methods to obtain data to feed into shellfish stock assessments it was also important to assess how to conduct statistically robust sampling for the stock assessments themselves.

A drawback in the current system is the lack of access to data for local fisheries managers and Regional Inshore Fisheries Groups where this falls outside the current stock-assessment programme. The North Atlantic Fisheries College (NAFC) in Shetland in collaboration with OLSPS Group completed a desktop review of strategies used in Scottish inshore waters to look at what data is currently available and ways to optimise future data collection strategies, for example by collecting data from more vessels or by sampling a smaller number of vessels more often.

The report also looked at whether or not daily catch rates could be used as an indicator of stock abundance in areas where there was a lack of information.

The report proposed a flexible method for optimising data-collection across a range of options that would better suit local needs. It outlines the potential for using inshore fishing vessels to collect a wide range of information and investigates the potential to select a limited number of vessels as a "reference fleet", which would be equipped with additional technology to gather more, high quality data.

There may be no "one size fits all" sampling programme that would suit all national, regional and local management requirements, but the report identifies that there is considerable potential for industry-derived data to make a significant contribution to both stock-assessments (currently carried out by Marine Scotland Science), and to provide valuable time-series data for use in fisheries management.

A clear next step would be to test the operation of such a stock assessment process within a defined area.



Socio-economic Factors and Fishing Drivers

To deliver a better understanding of the significant contribution that the Scottish inshore sector provides to the social, economic and cultural fabric of Scotland, a detailed 'sustainable livelihoods' analysis was undertaken.

A team from SAMS Research Services Ltd (SRS) & Imani Ltd collected and analysed cultural data in conjunction with already-available socio-economic datasets in a way that could be replicated and updated in future, using the 'Sustainable Livelihoods Approach' (SLA), which recognises both tangible and intangible factors required to make a livelihood sustainable and risk-resilient. Five types of 'capital' were defined which are critical to the function of the industry (Fig 3): **natural capital** (e.g. marine ecosystems and weather); **physical capital** (e.g. boats, harbours and roads); **financial capital** (e.g. income and access to loans);

human capital (e.g. skilled crew and training opportunities); and **social and cultural capital** (e.g. community and family relationships and cultural heritage).

Social and cultural factors are important drivers of the industry with clear linkages between these and economic impacts within inshore fishing and across the value chain. Factors such as access to finance in turn influence social and cultural factors such as succession planning. The report shows how important it is that policy-makers understand these links, and the reasons behind them that drive the diversity and related activities in different regions and sectors. For example, fish caught in the North West Highlands may be processed in central Scotland, or the lack of young entrants to the industry may be caused by competition for staff from other sectors.

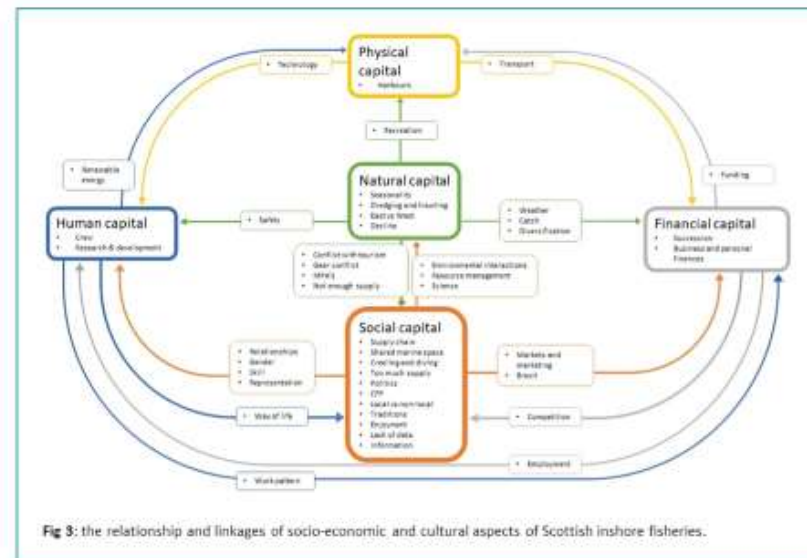


Fig 3: the relationship and linkages of socio-economic and cultural aspects of Scottish inshore fisheries.

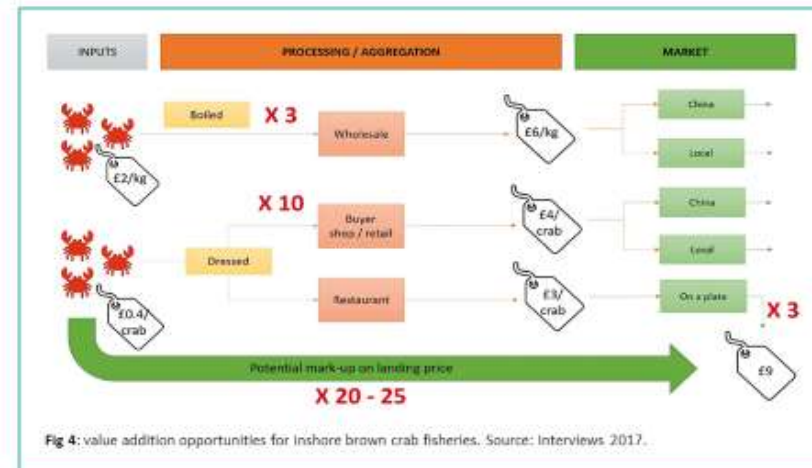


Fig 4: value addition opportunities for inshore brown crab fisheries. Source: Interviews 2017.

From an economic perspective, six different value-chain matrix models were identified and described across the whole **market system** reflecting different supply routes to market and local supply methods e.g. 'from boat to plate, locally' can generate local value addition of ten times or more, but this is a small proportion of the overall market and not always replicable across other volumes. Other supply methods such as direct transport out of region, can have very low additional local impact, although there may be significant added value in other UK areas where processing is carried out.

The Figure 4 above illustrates the value added in processing and aggregation (by fishers themselves, or intermediaries) and final sale. While this will vary between products and markets, the importance of inshore products nationally and globally is demonstrated.

Key figures across the inshore fisheries market system matrix showed:

- a total of 3086 were employed in Scotland across this value chain (2374 people directly employed in fishing and 712 additional jobs generated through inshore fishing)
- direct income to inshore fishers was £63.66m, with an additional £38.20m to other sectors, giving a total of £101.85m in Scotland
- local impacts can be limited beyond the landing values unless local processing is undertaken
- often the wider economic impacts are significant but take place elsewhere. This is important for policymakers – jobs in Bellshill, Larkhall and Glasgow depend on inshore fishing – arguably, support for growth in processing could focus on more deprived areas than the fishing ports, though provenance is still a key selling point.

Fishing Drivers

In a related piece of work, we interviewed 105 fishers at 42 ports to better appreciate the main drivers that influenced their business, including why they went fishing on a particular day or placed gear in a particular area. These responses were then used to inform a model that explored fishing behaviour (the probability a vessel would go fishing) based on a number of environmental and economic variables. The list of factors that influence when or whether a vessel goes fishing include changes in weather, wind speed and direction, fish stocks, catch prices, other marine users etc. Smaller vessels and those with a limited range were more likely to be affected. Whilst this work was experimental, the data gathered generated some basic statistical models that could be used to inform decision-making and suggests that more detailed research is merited. Developing a decision support tool could help fishery and marine managers to assess the potential implications of management or planning proposals for fishing activity, the effects of changing climate and extreme weather events, vessel modernisation, etc. It could also help inform the potential compound effects of, for example, the displacement of fishing activity in a given area and the potential knock-on effects for the fishermen and stocks in adjacent areas.



The rate of human-induced change on land and sea is significant. The seas are warming, pH is reducing, and deoxygenation is occurring. The biological consequences of these physical and chemical changes are becoming more apparent, including effects on fish stocks and distribution, with some species migrating northwards into cooler waters. Sea level rise and more extreme weather events may also impact fishers' ability to go to sea. Gathering and understanding the implications of such environmental and socio-economic drivers needs to be aligned with fisheries and other data to provide a comprehensive and ecosystem wide approach.

International Interest in SIFIDS App and Systems Development

There is increasing international interest in the results and in the prototype equipment and processes developed by the SIFIDS project, with presentations made to stakeholders in Italy, Hong Kong, the Azores, Peru and, most recently, Lake Victoria in central Africa. A project designed to reduce by-catch in an artisanal shrimp fishery in Peru is currently underway using an adaptation of the 'FISH1 App' and GPS trackers to record where fishing is taking place, catch and landings.



Final Reports

All final reports and videos will be uploaded onto the SIFIDS Project website in due course:
<https://www.masts.ac.uk/research/emff-sifids-project/>

Scottish Inshore Fisheries Integrated Data System (SIFIDS)

– a project co-ordinated by Marine Alliance for Science and Technology (MAST) with funding from European Maritime and Fisheries Fund (EMFF)

Contact information

For more information about the SIFIDS project and related work, please contact:

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SIFIDS Project Facilitators:
Ali McKnight, Kyla Orr and Kathryn Logan.



SIFIDS
Scottish Inshore Fisheries
Integrated Data System

SeaScope Fisheries Research
Independent Marine Consultants

marine scotland
Scottish Government
gov.scot

European
Maritime &
Fisheries Fund

SAMS
Research Services Ltd

CRMG
Coastal Resources
Management Group

NAC Marine Centre
University of the
Highlands and Islands

imani
DEVELOPMENT
global vision, local knowledge

University of
St Andrews

5.5 Flyer used to recruit vessels for Work Packages 2, 5 and 8

Scottish Inshore Fisheries Integrated Data Systems (SIFIDS)



A research project investigating innovative technology and automated systems aimed at reducing the reporting burden on fishermen, while improving the data collection necessary for marine planning and fisheries management

We are asking creel fishermen for their help, by hosting a researcher on their vessel for 1-day

Benefits of this research to fishermen?

- ✓ Automatic recording of data may reduce fishermen's reporting burden in the future (less paper, get technology to do the work)
- ✓ Potential to accurately demonstrate the location of key fishing grounds and origin of catch (crucial within marine planning)
- ✓ Better understanding of how shellfish stocks vary locally
- ✓ Opportunity for fishermen to contribute ideas and knowledge
- ✓ Respects the sustainable fishing practices of inshore fleet, and challenging working conditions faced by fishermen
- ✓ **Minimal impact on fishing time, and no additional paperwork required**



What data will be collected during the sea-trip?

- Vessel location, speed and direction when steaming and fishing (GPS track)
- Type(s) of fishing gear being used
- Quantity of shellfish retained and discarded
- Vessel layout and deck arrangement
- Reasons for fishing and what may prevent fishing trip
- Video of catch (with agreement of skipper)
- All data recording equipment is removed from the vessel after the trip

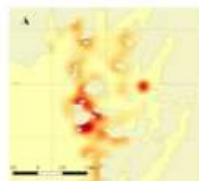


Who are the 'researchers'? And what about safety and insurance?

- The sea-trip team are from Seascope Fisheries Research Ltd.
- They have all the necessary insurance and safety certificates to work on fishing vessels (plus hundreds of days experience at sea)
- The skipper is in charge, and must tell the researcher where to stand to minimise impact to fishing operations and for safety, but where catch handling can be clearly viewed

Who will see that data and will it ever be used against the vessel?

- All raw data will be processed and held by the University of St Andrews, and will be treated in strict confidence
- Only aggregated or anonymised data will be presented in reports. The data collected will NOT be used against fishermen or vessels to restrict fishing activities. It is for research purposes not enforcement



To get involved and host a researcher for a day call 0800 043 3474

Project Facilitators - Kyla Orr: marineconsulting@kylaorr.com and Kathryn Logan: logank2@ukif.com

What about data that is already supplied to the Fisheries Office?

Landings data that fishermen submit to the Fisheries Office on Fish1 forms, logbooks or e-logs does not show fishing locations or effort at the fine scale required for local marine planning. Through the SIFIDS project we will investigate how data from Fish1 forms/ logs can be linked to vessel track data (GPS or AIS, if available) to identify the location of key fishing grounds and estimate Landings per Unit Effort (LPUE) - which are essential for understanding the status of shellfish stocks locally.

National Legislation that is driving this research:

The Marine (Scotland) Act 2010 enabled the set-up of twelve Marine Planning Regions around Scotland. The first two pilot Marine Planning Partnerships (MPP) were recently established in the Clyde and Shetland. The MPPs are required to develop a *marine spatial plan* (similar to town planning), in which fishing activities and marine resources are recognised. Very little data is currently available to identify fishing grounds and the health of the stocks, and it's crucial that this information-gap is filled so that fishing activities are accurately represented in future planning, for the benefit of fishermen and their local communities.



By 2020, Marine Scotland also intends to implement monitoring for all sizes of vessels to inform on the footprint of inshore fishing, and ensure that stocks are exploited sustainably (Scottish Inshore Fisheries Strategy 2015). With input from fishermen, the results of this SIFIDS project could help identify an appropriate form of monitoring that would be acceptable to industry.

How will the SIFIDS results be interpreted?

We will collect a 1-day GPS track for each vessel, but this alone does not show the location of fishing activity. So we will also gather information on vessel speed and movement patterns when fishing, which could then be used to automatically map fishing grounds. Together with landings data obtained through Fish1 forms / logs we will also estimate Landing Per Unit Effort (see above).



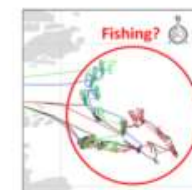
During the 1-day sea trip we will ask fishermen about any factors that may prevent them fishing. This information will be used to help predict how fishermen are impacted by a range of different factors, including changing weather patterns (climate change) and market conditions, to better understand the 'vulnerabilities' of the industry.

To account for the large variation in fishing practices we will be working with more than 100 different vessels located around Scotland.

Locations where we are seeking vessels to participate [12 metres and under, static gear]:

The SIFIDS Project does not have resources to survey all 12MU vessels, so we are seeking vessels from selected ports within the following Marine Regions only: Argyll, North West Highlands, Forth and Tay, North East and Outer Hebrides. (Please contact us for more information on selected 'study ports'.)

This is a University of St Andrews project, funded by the European Maritime and Fisheries Fund (EMFF)



5.6 Information sheet sent to previous and current SIFIDS project participants about the solar powered GPS tracker trial

SIFIDS PROJECT EQUIPMENT TRIAL: SOLAR-POWERED GPS TRACKER INFORMATION SHEET JUNE/JULY 2019



SIFIDS is looking for six host vessels to trial a solar-powered GPS unit during June and July 2019. The unit is considered ideal for small vessels, under 10 metres, including those that may have no wheelhouse or hard-wiring. The aim of this trial is to test the quality of reception/transmission and the tracks produced, plus the capacity of the solar panel, so the type of fishing is not important. The units would be retrieved after the trial for testing. The GPS data would only be visible to the Project and the vessel operator. Anyone interested should contact the Project Facilitators (see below).



New Solar-powered GPS tracker unit and battery pack for trial on board smaller fishing vessels (10mu).

Approx dimensions :
Black box (battery) / 5 amp panel
~ 24 cm wide x 10 cm deep
(~10 x 4 inches)

The solar panel could be fitted on top of the box or mounted separately. The box can go in any orientation, but away from large metal bulkheads. Host vessels can identify where they wish the units to go, and SIFIDS will identify suitable mounting options.

The battery unit is built to IP67 (Ingress Protection) Standard, so is weather proof and capable of withstanding short-term immersion in up to 1m water.

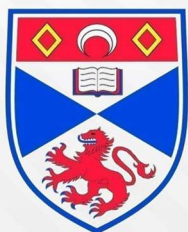


This fitted example is an older model, approx. twice the size of the new version.

Scottish Inshore Fisheries Integrated Data System (SIFIDS) -
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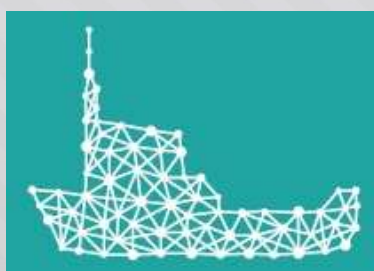
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